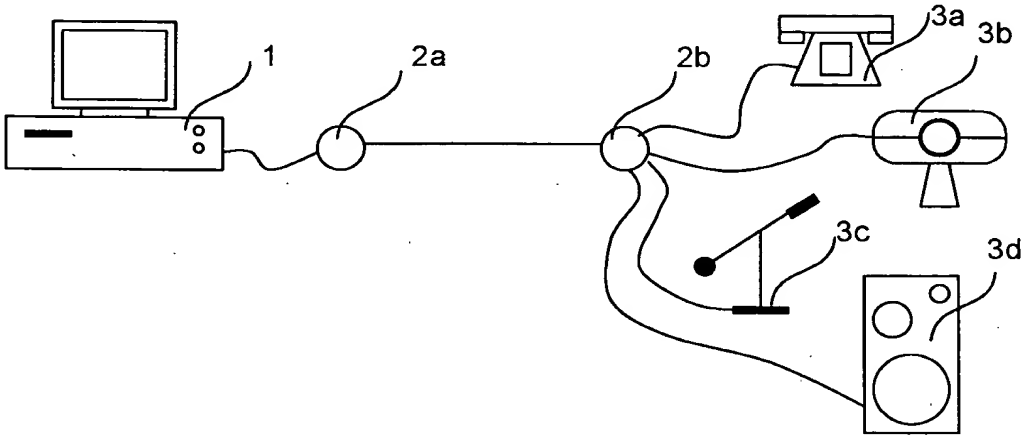

Figure 1

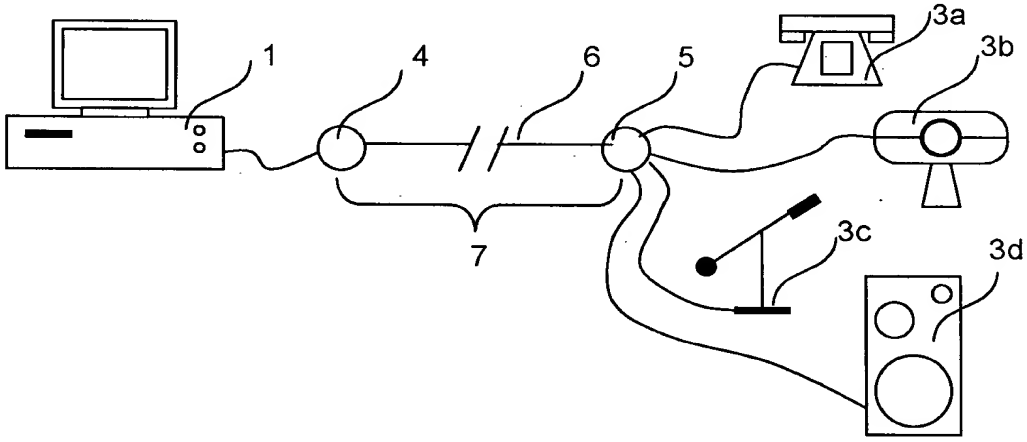

Figure 2

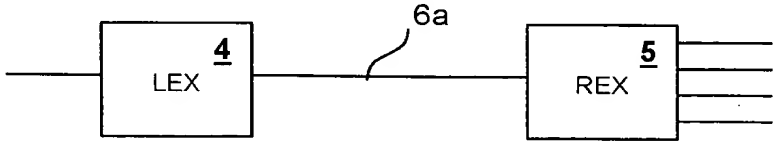

Figure 3

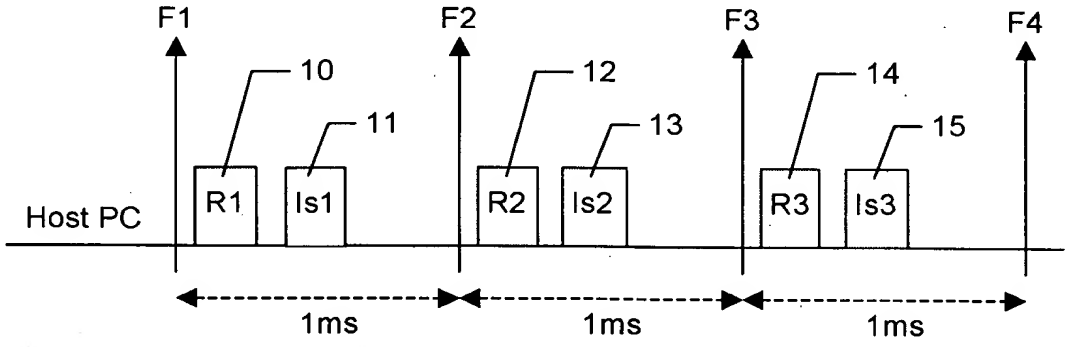

Figure 4

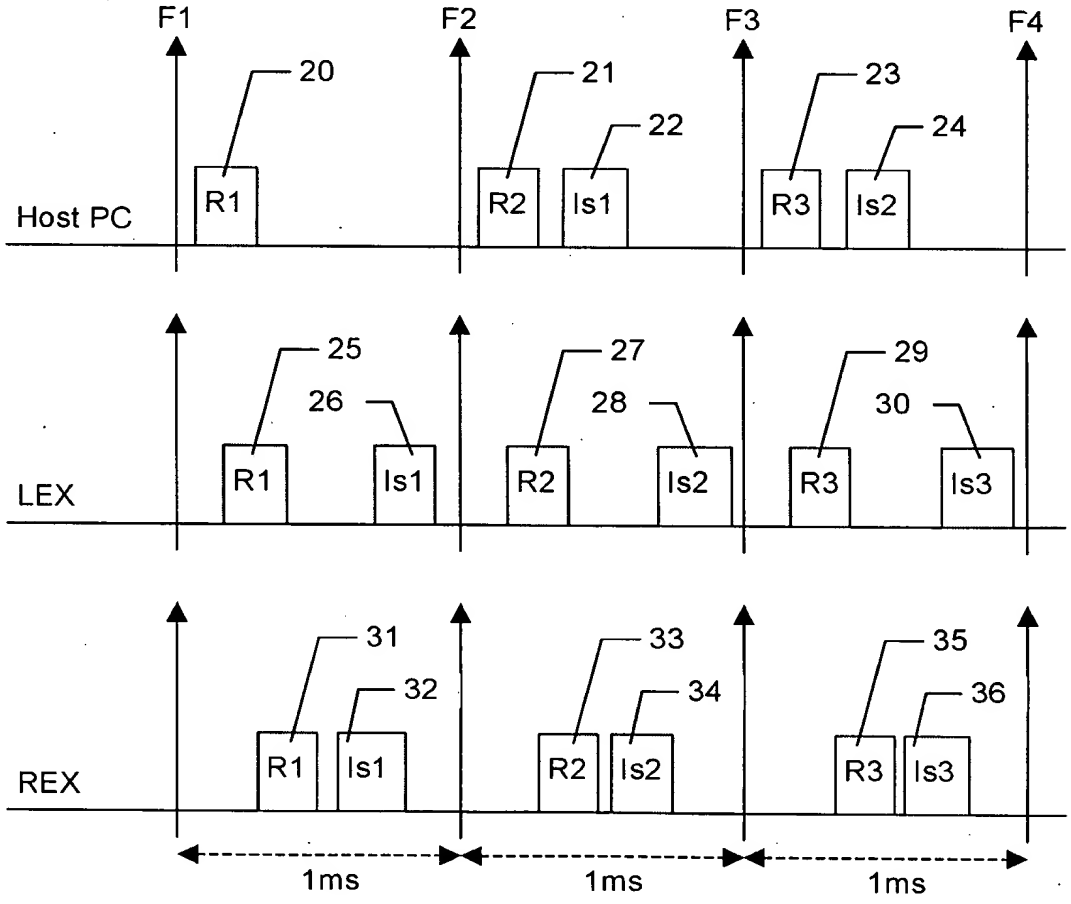

Figure 5

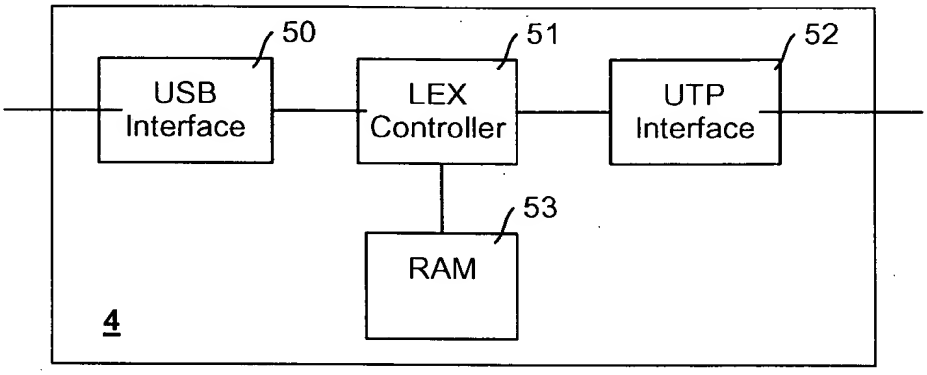

Figure 6

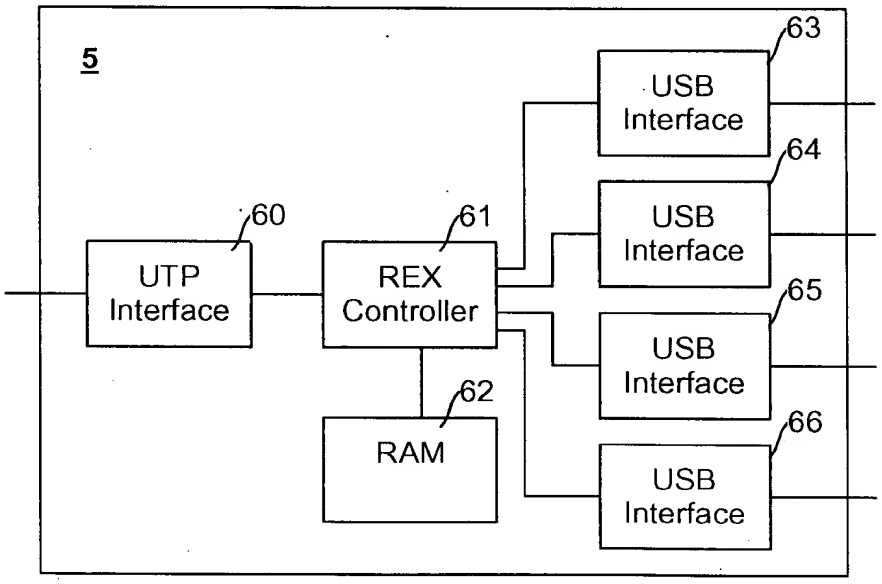

Figure 7

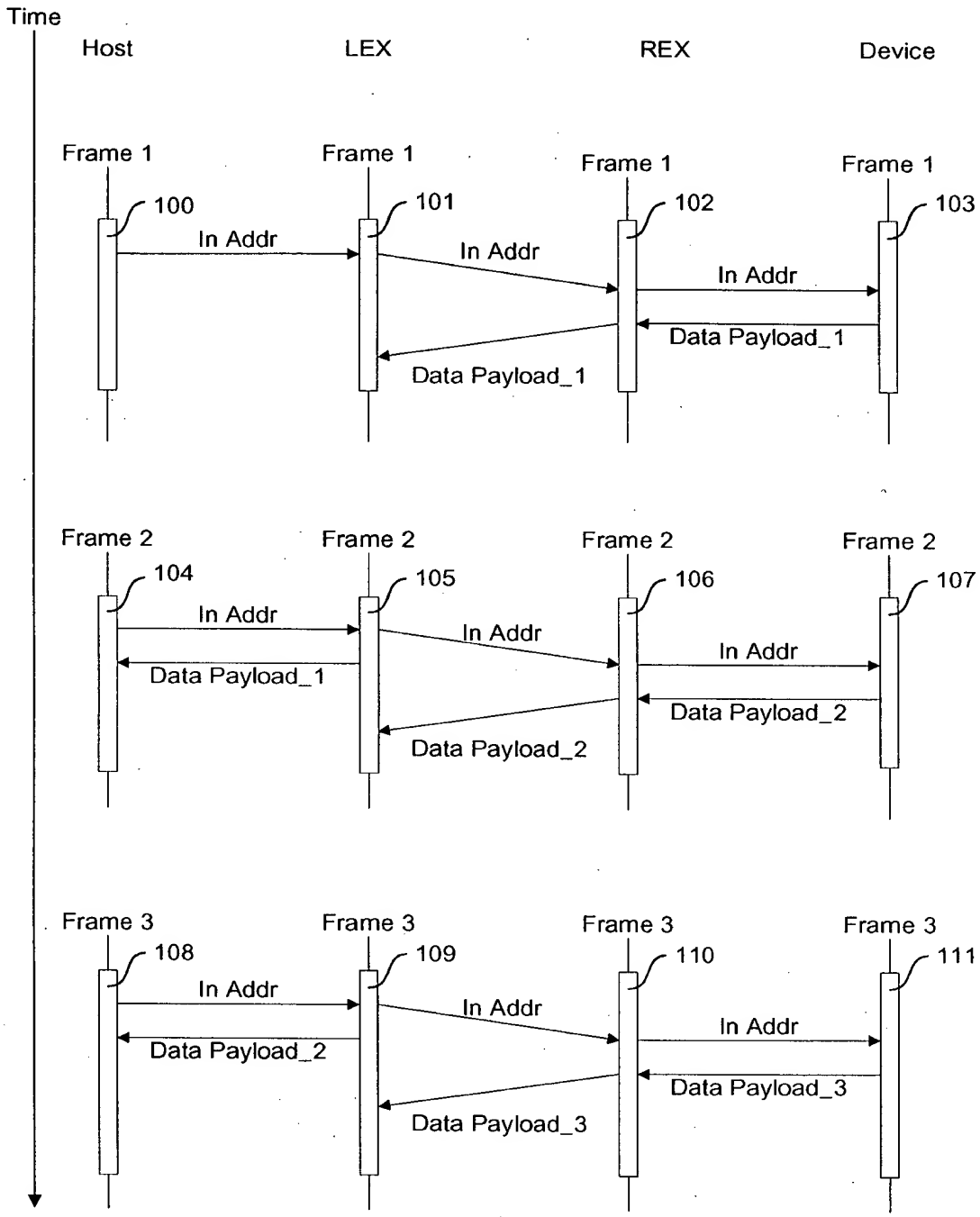
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
100
101
102
103
In Addr
In Addr
In Addr
Data Payload_1
Data Payload_1
Frame 2
Frame 2
Frame 2
Frame 2
104
105
106
107
In Addr
In Addr
In Addr
Data Payload_1
Data Payload_2
Data Payload_2
Frame 3
Frame 3
Frame 3
Frame 3
108
109
110
111
In Addr
In Addr
In Addr
Data Payload_2
Data Payload_3
Data Payload_3

Figure 8

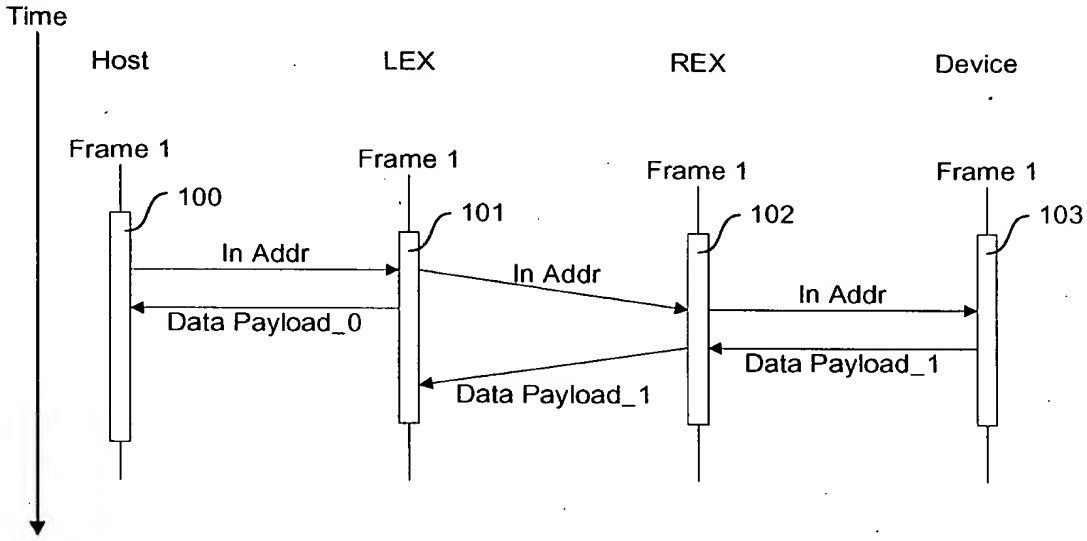
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
100
101
102
103
In Addr
In Addr
In Addr
Data Payload_0
Data Payload_1
Data Payload_1

Figure 9

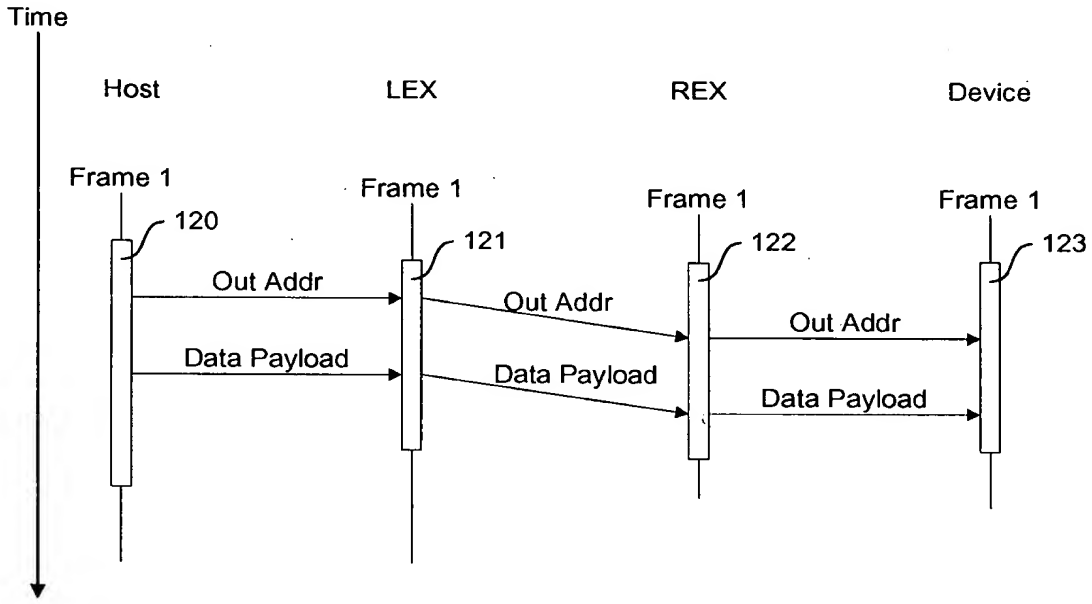
Time
Host
LEX
REX
Device
Frame 1
120
Frame 1
121
Frame 1
122
Frame 1
123
Out Addr
Out Addr
Out Addr
Data Payload
Data Payload
Data Payload

Figure 10

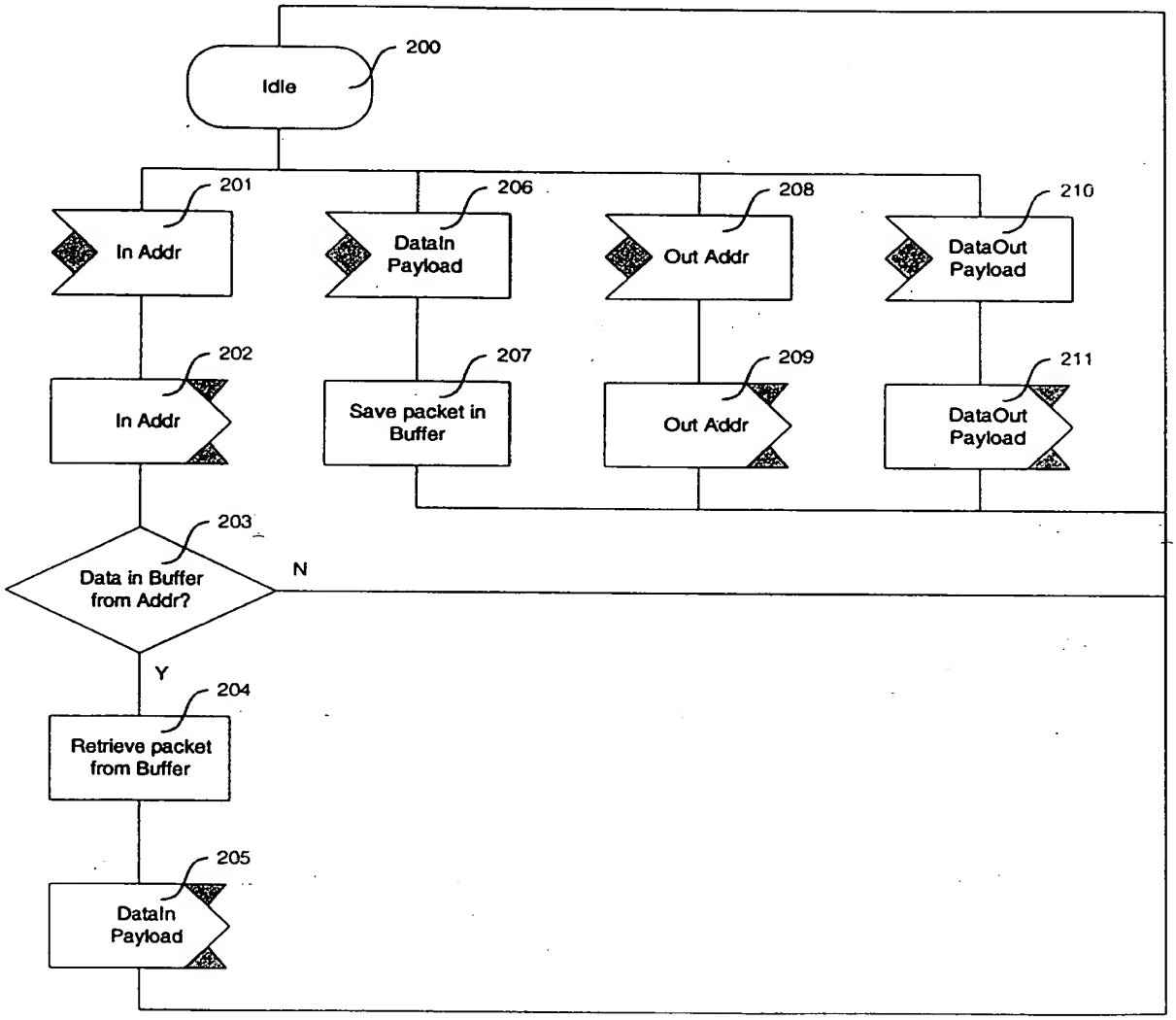
200
Idle
201
In Addr
206
DataIn Payload
208
Out Addr
210
DataOut Payload
202
In Addr
207
Save packet in Buffer
209
Out Addr
211
DataOut Payload
203
Data in Buffer from Addr?
N
Y
204
Retrieve packet from Buffer
205
DataIn Payload

Figure 11

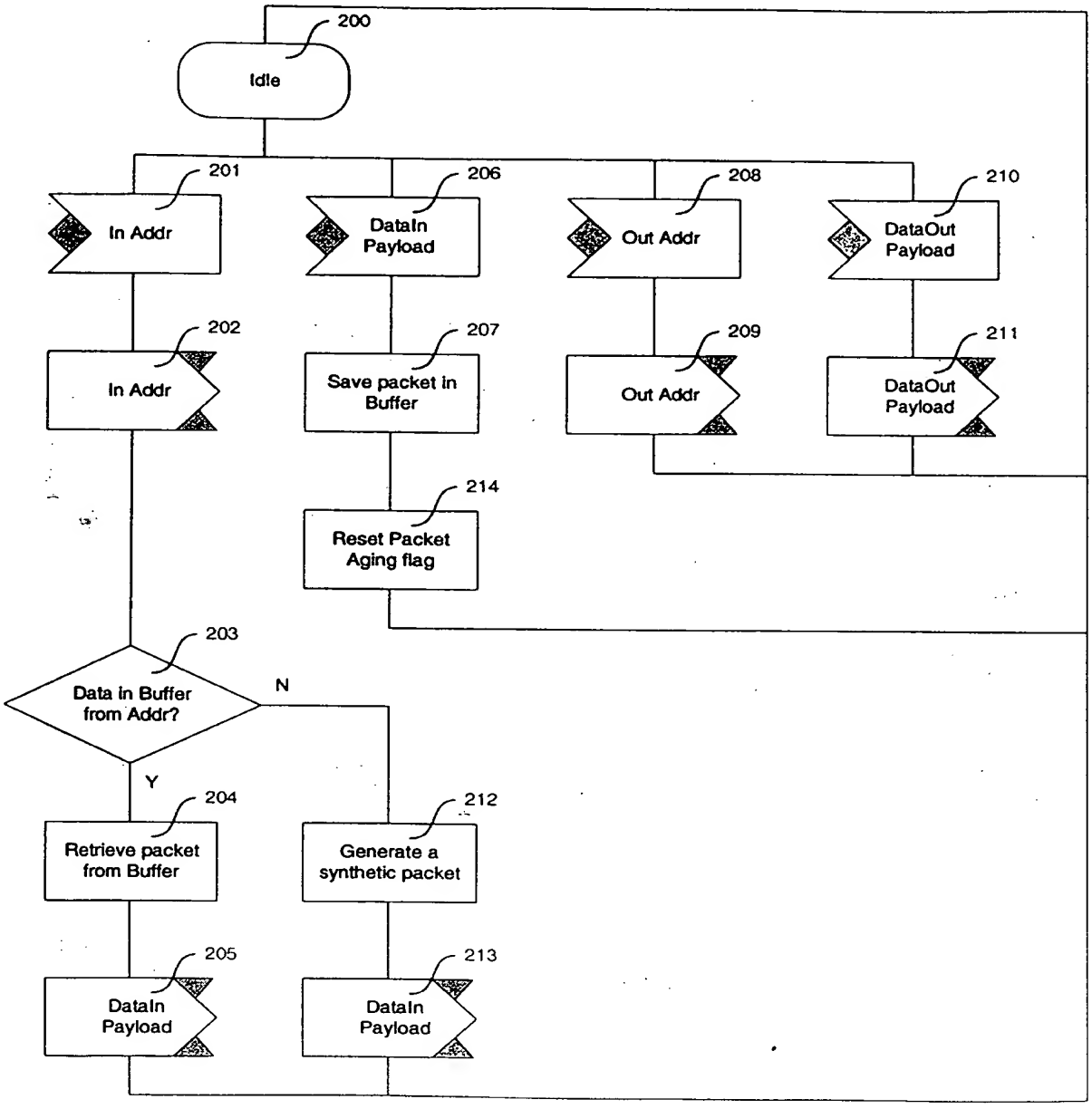
200
Idle
201
In Addr
206
DataIn Payload
208
Out Addr
210
DataOut Payload
202
In Addr
207
Save packet in Buffer
209
Out Addr
211
DataOut Payload
214
Reset Packet Aging flag
203
Data in Buffer from Addr?
N
Y
204
Retrieve packet from Buffer
212
Generate a synthetic packet
205
DataIn Payload
213
DataIn Payload

Figure 12

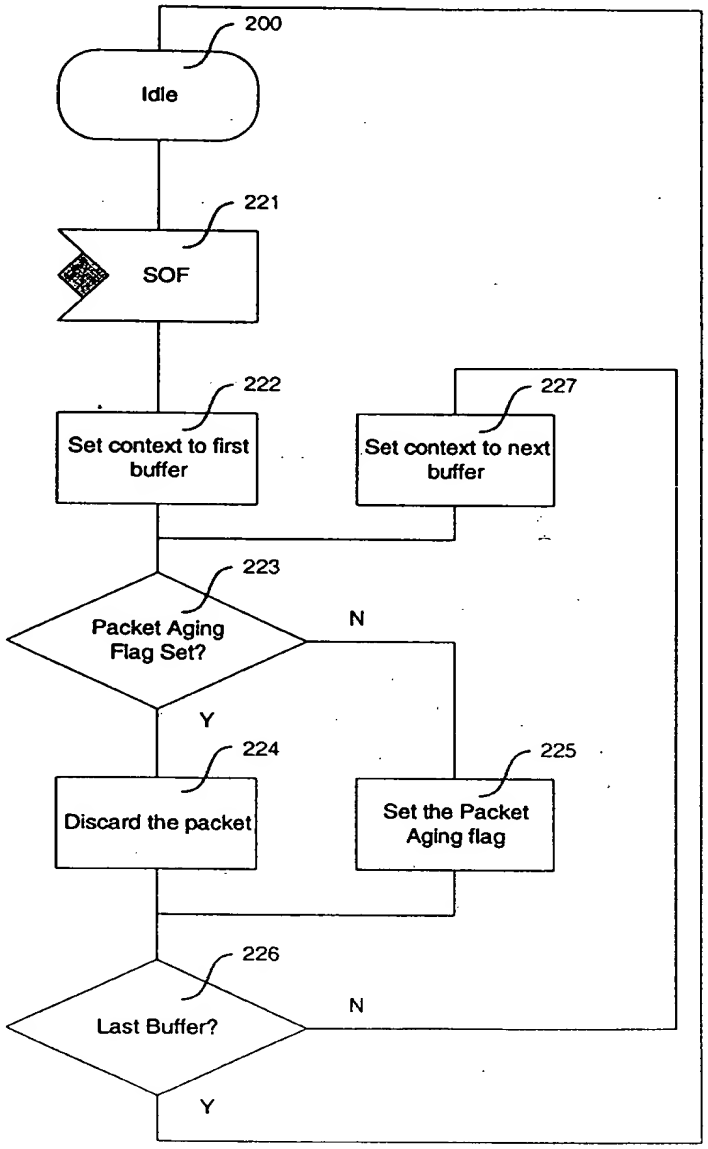
200
Idle
221
SOF
222
Set context to first buffer
227
Set context to next buffer
223
Packet Aging Flag Set?
N
Y
224
Discard the packet
225
Set the Packet Aging flag
226
Last Buffer?
N
Y

Figure 13

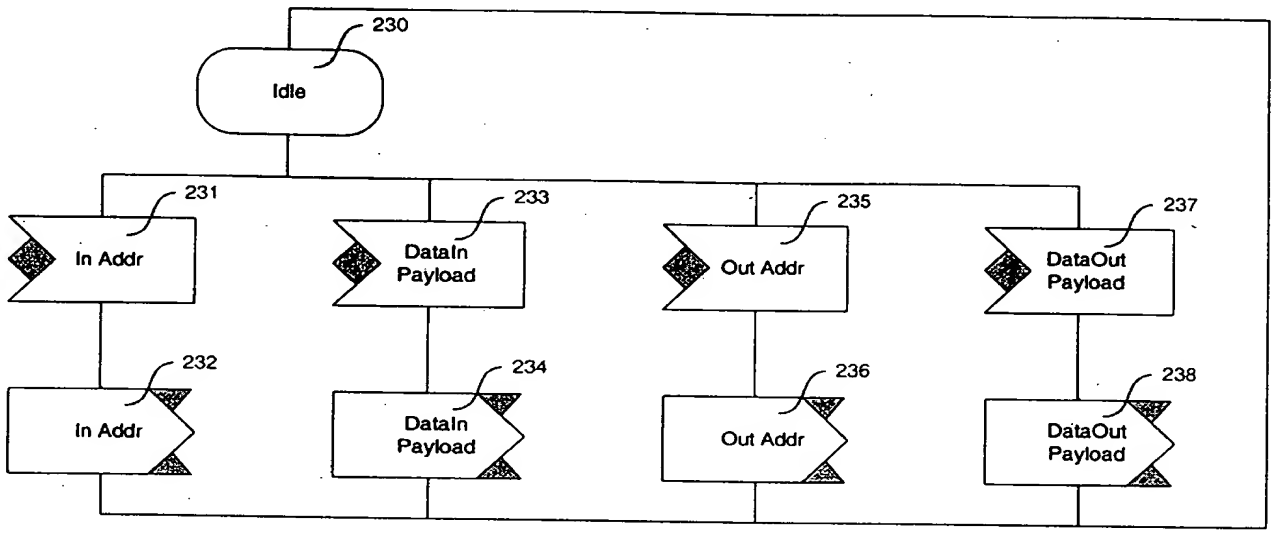
230
Idle
231
In Addr
232
In Addr
233
DataIn Payload
234
DataIn Payload
235
Out Addr
236
Out Addr
237
DataOut Payload
238
DataOut Payload

Figure 14

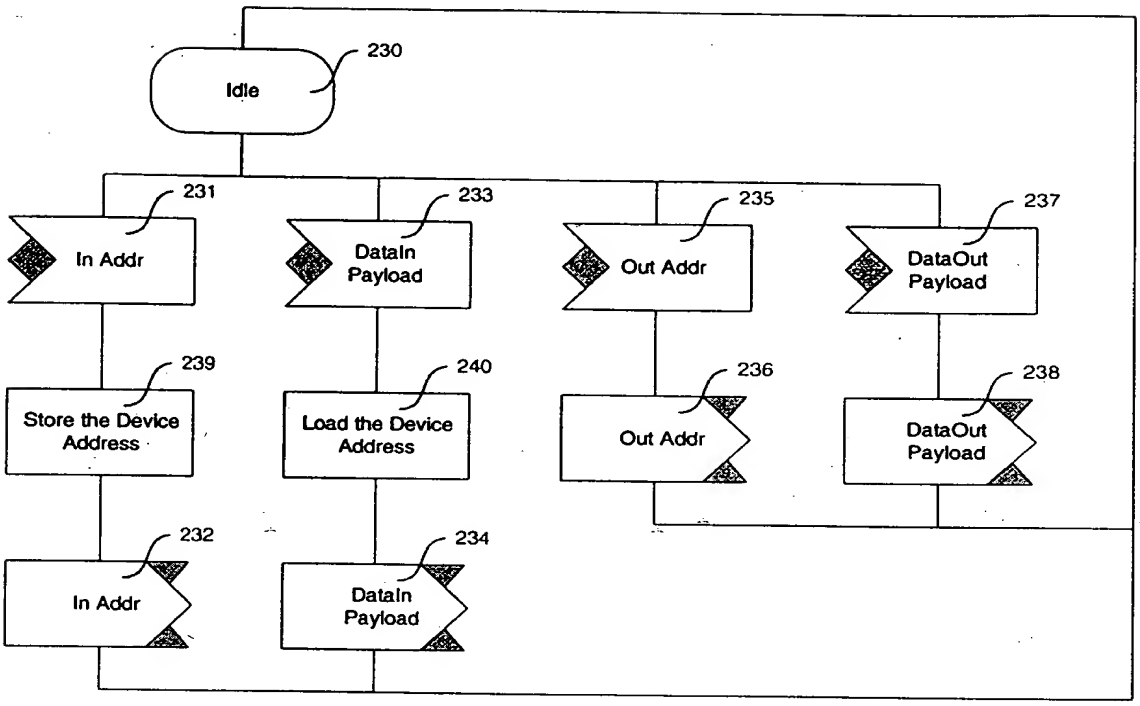
230
Idle
231
In Addr
233
DataIn Payload
235
Out Addr
237
DataOut Payload
239
Store the Device Address
240
Load the Device Address
236
Out Addr
238
DataOut Payload
232
In Addr
234
DataIn Payload

Figure 15

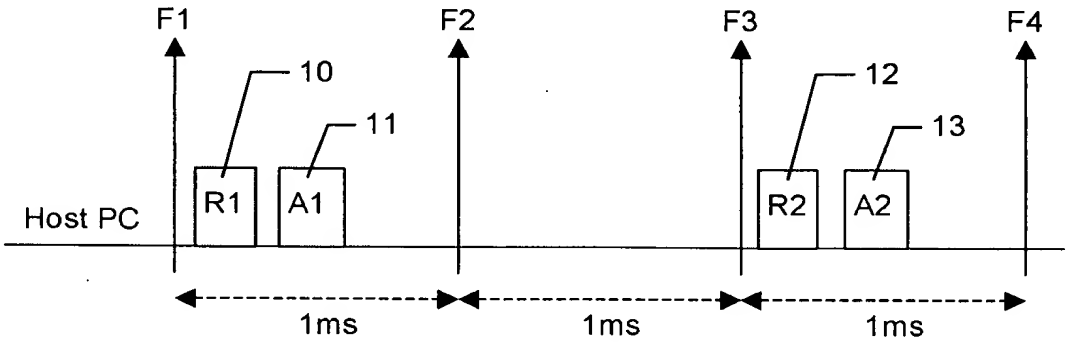

Figure 16

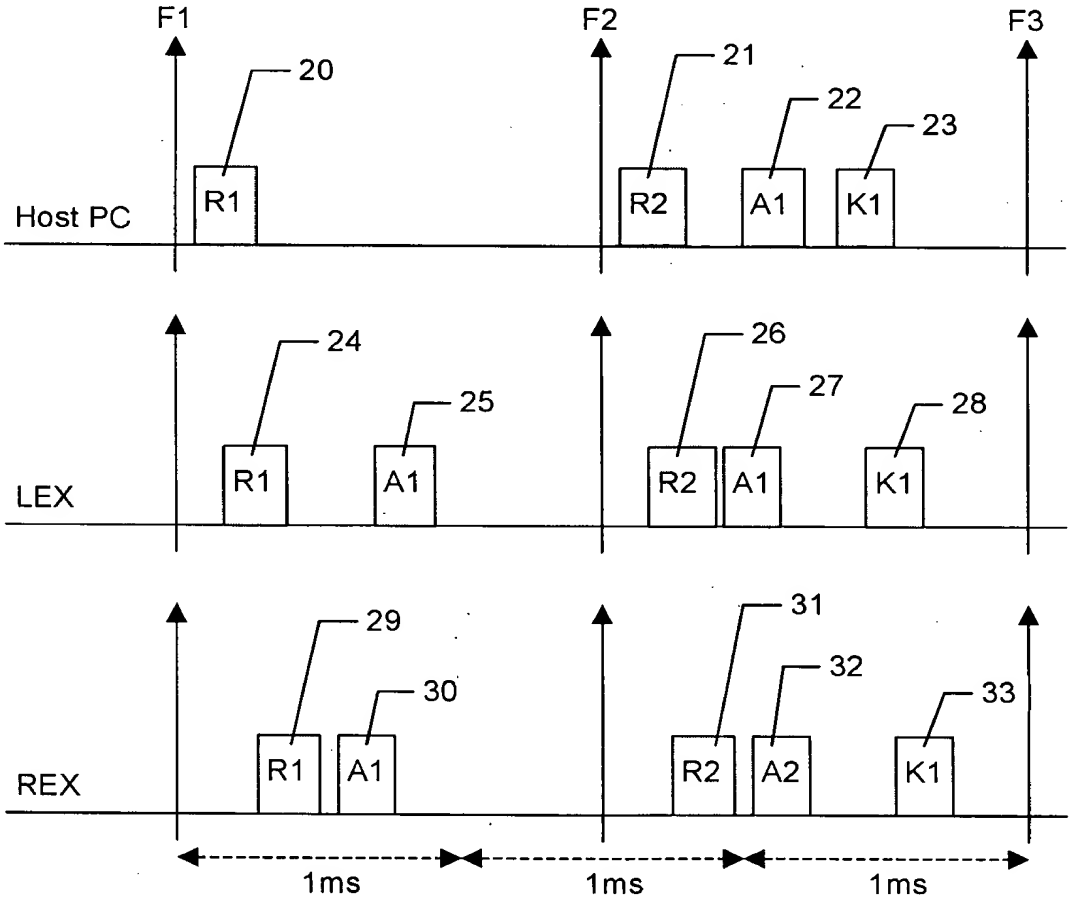

Figure 17

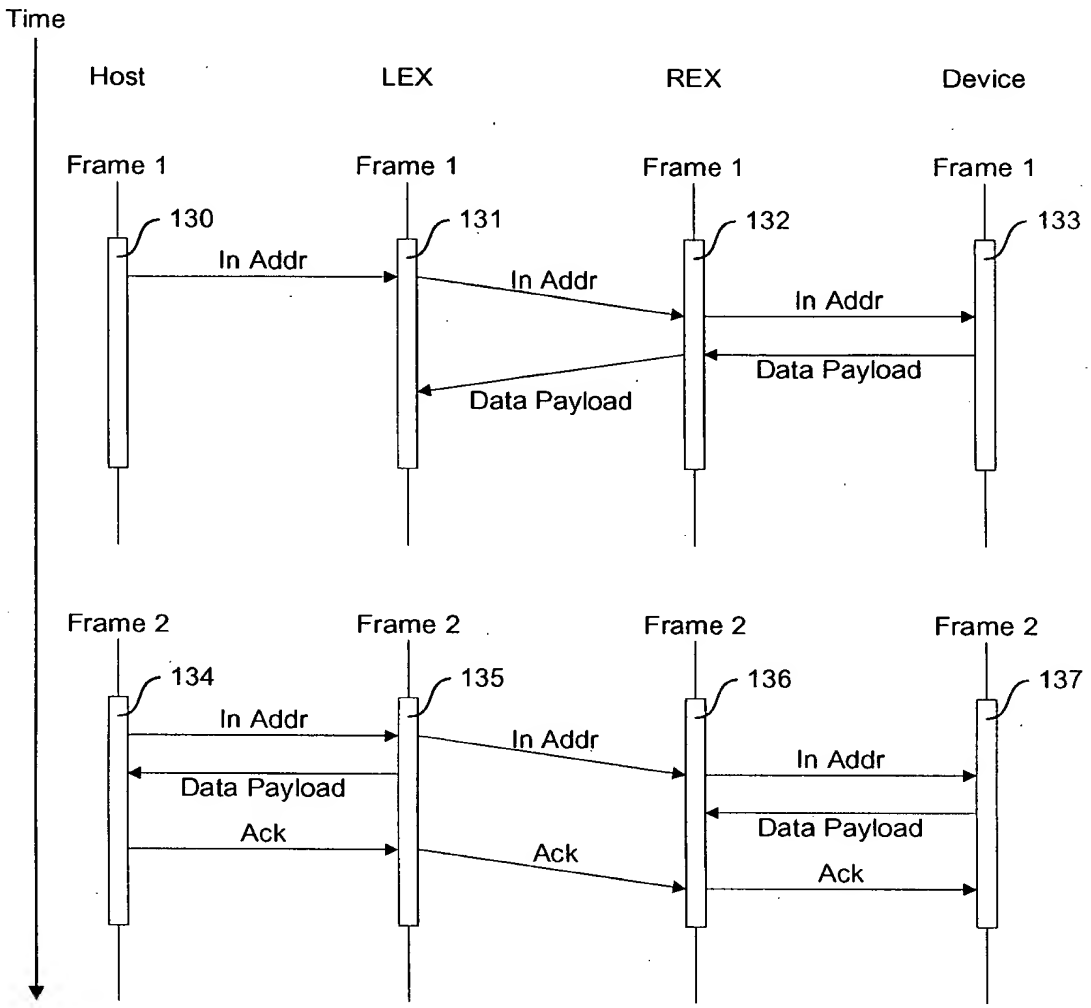
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
130
131
132
133
In Addr
In Addr
In Addr
Data Payload
Data Payload
Frame 2
Frame 2
Frame 2
Frame 2
134
135
136
137
In Addr
In Addr
In Addr
Data Payload
Data Payload
Ack
Ack
Ack

Figure 18

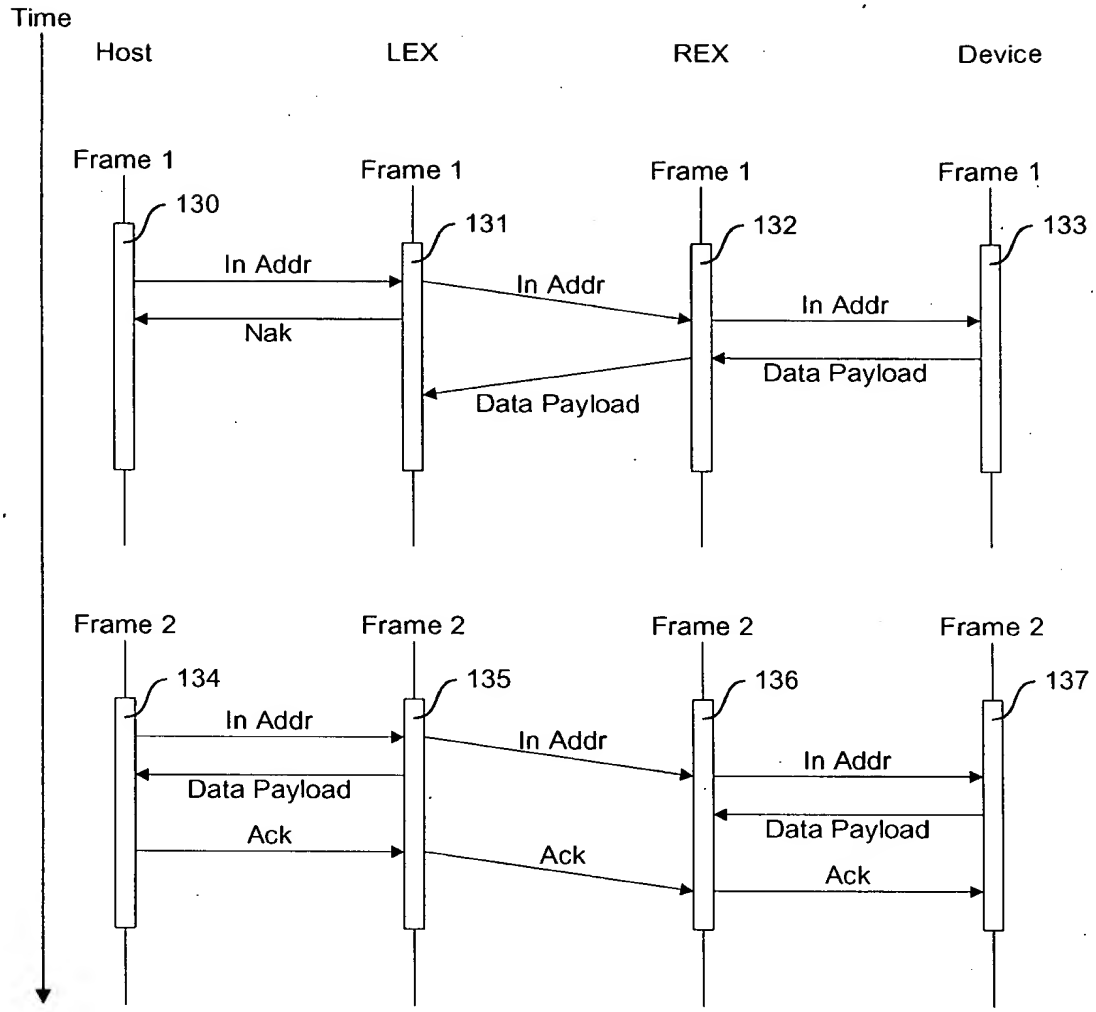
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
130
131
132
133
In Addr
In Addr
In Addr
Nak
Data Payload
Data Payload
Frame 2
Frame 2
Frame 2
Frame 2
134
135
136
137
In Addr
In Addr
In Addr
Data Payload
Data Payload
Ack
Ack
Ack

Figure 19

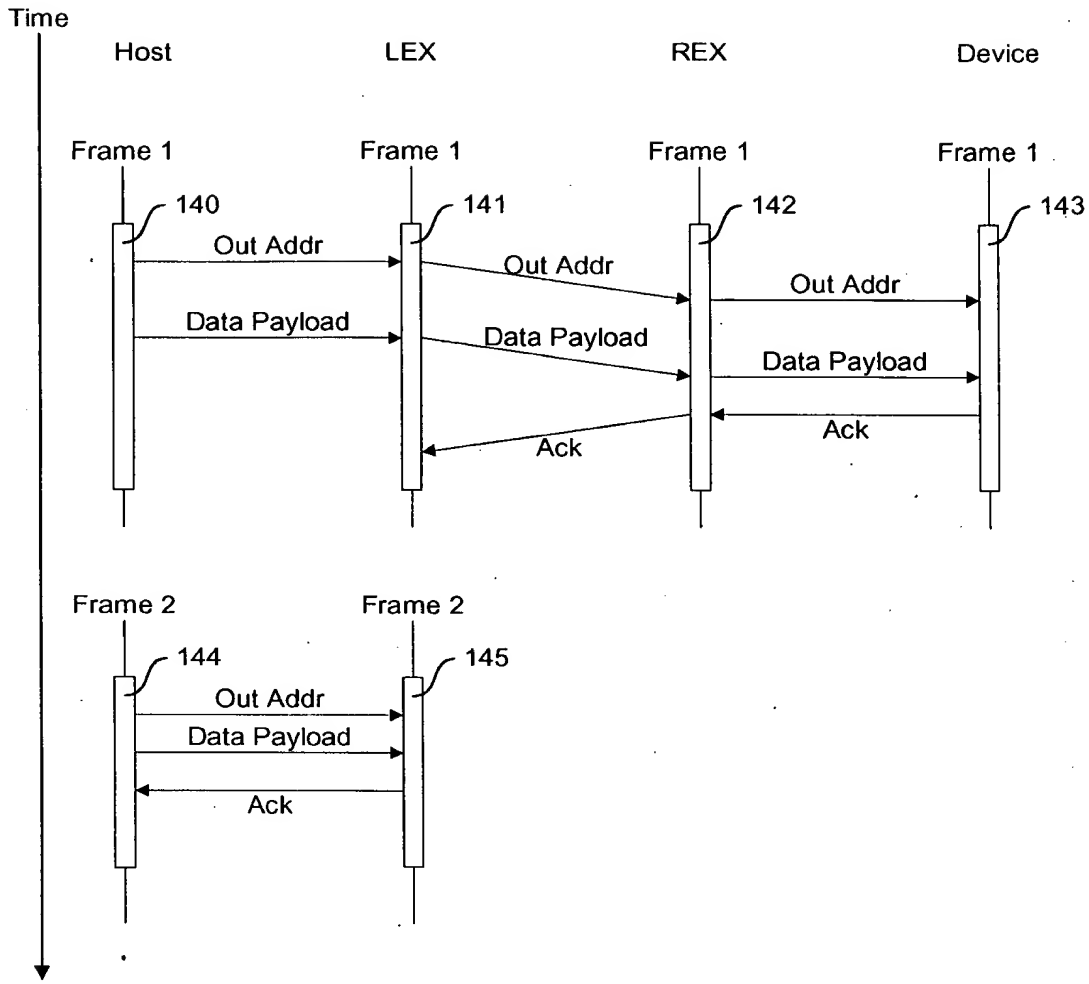
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
140
141
142
143
Out Addr
Out Addr
Out Addr
Data Payload
Data Payload
Data Payload
Ack
Ack
Frame 2
Frame 2
144
145
Out Addr
Data Payload
Ack

Figure 20

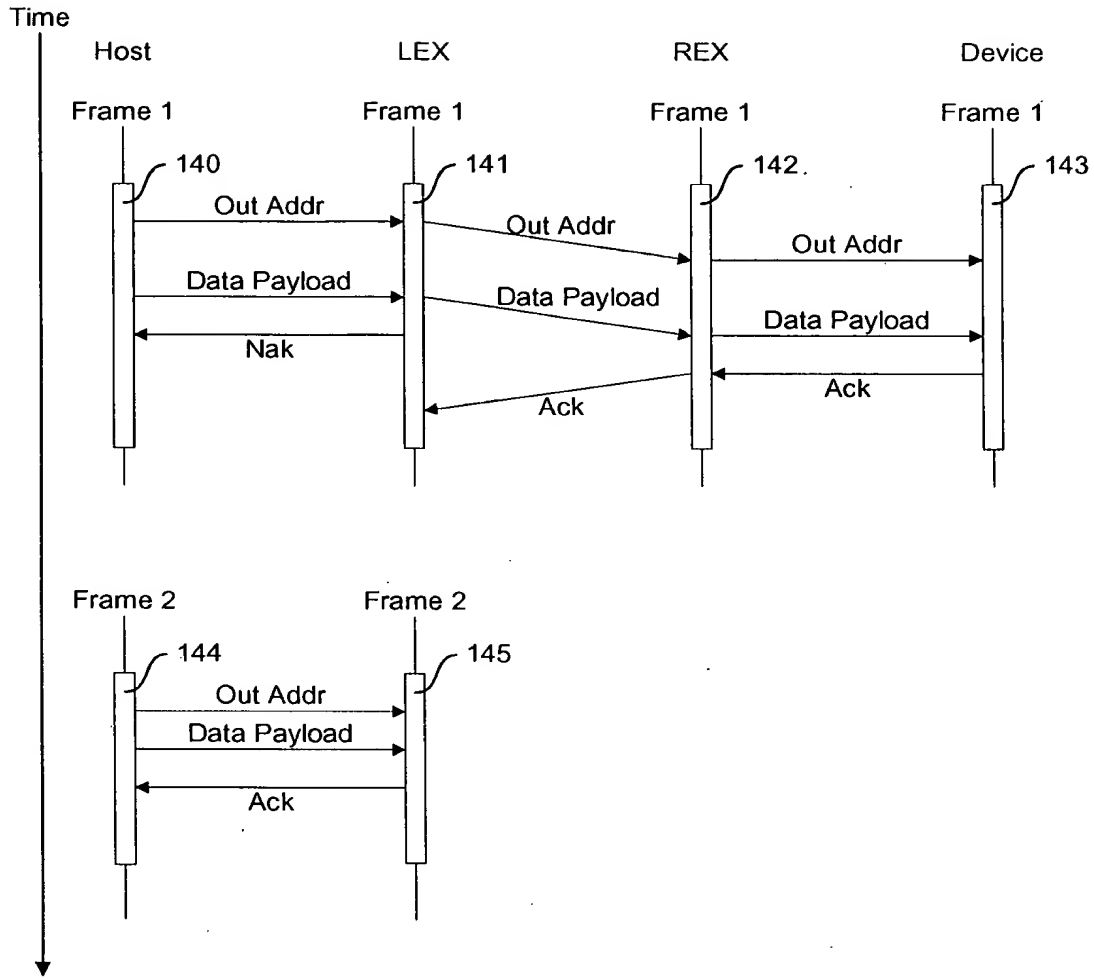
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
140
141
142
143
Out Addr
Out Addr
Out Addr
Data Payload
Data Payload
Data Payload
Nak
Ack
Ack
Frame 2
Frame 2
144
145
Out Addr
Data Payload
Ack

Figure 21

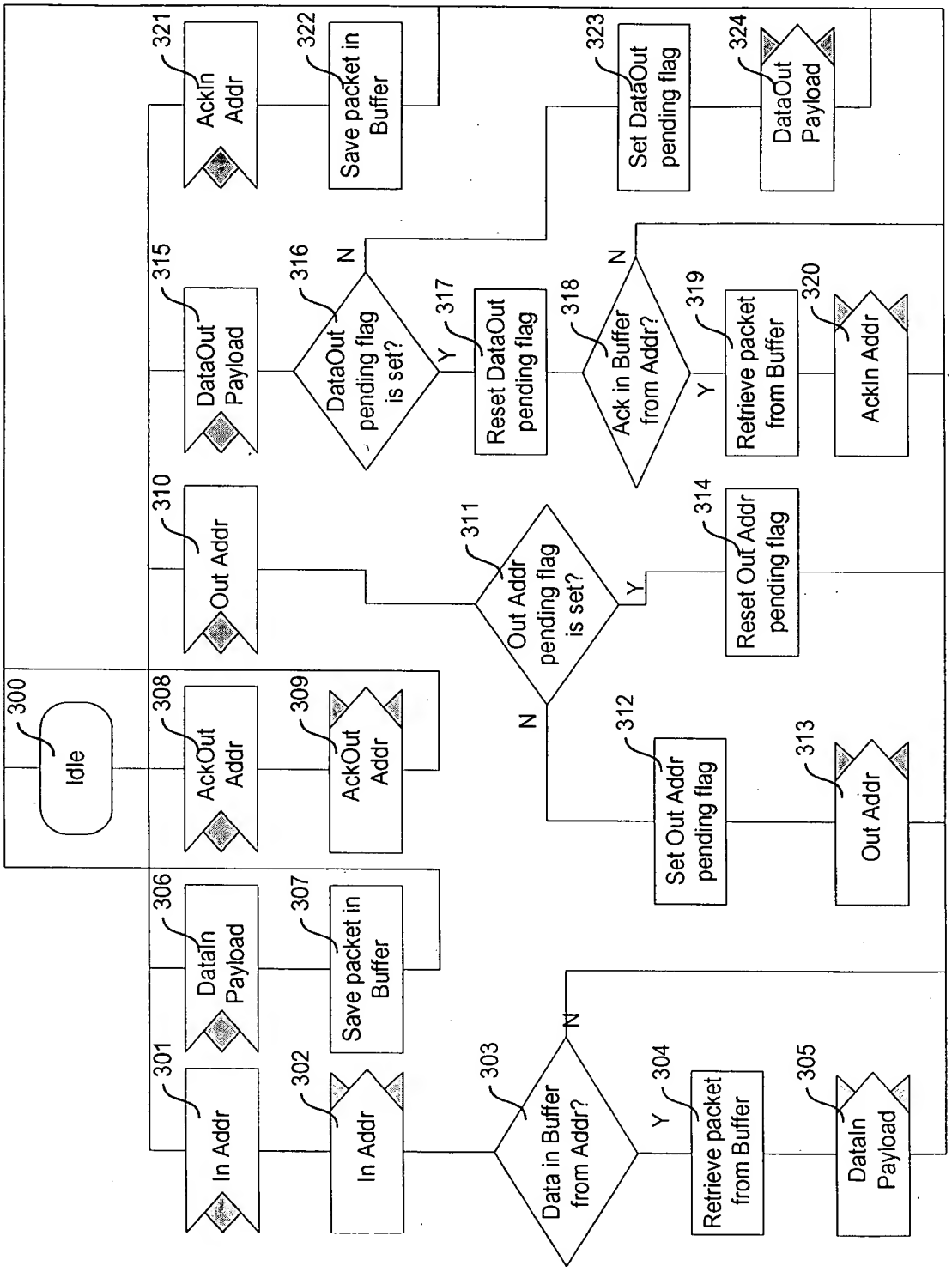
300
Idle
301
In Addr
302
In Addr
303
Data in Buffer from Addr?
304
Retrieve packet from Buffer
305
DataIn Payload
306
DataIn Payload
307
Save packet in Buffer
308
AckOut Addr
309
AckOut Addr
310
Out Addr
311
Out Addr pending flag is set?
312
Set Out Addr pending flag
313
Out Addr
314
Reset Out Addr pending flag
315
DataOut Payload
316
DataOut pending flag is set?
317
Reset DataOut pending flag
318
Ack in Buffer from Addr?
319
Retrieve packet from Buffer
320
AckIn Addr
321
AckIn Addr
322
Save packet in Buffer
323
Set DataOut pending flag
324
DataOut Payload
Y
N

Figure 22

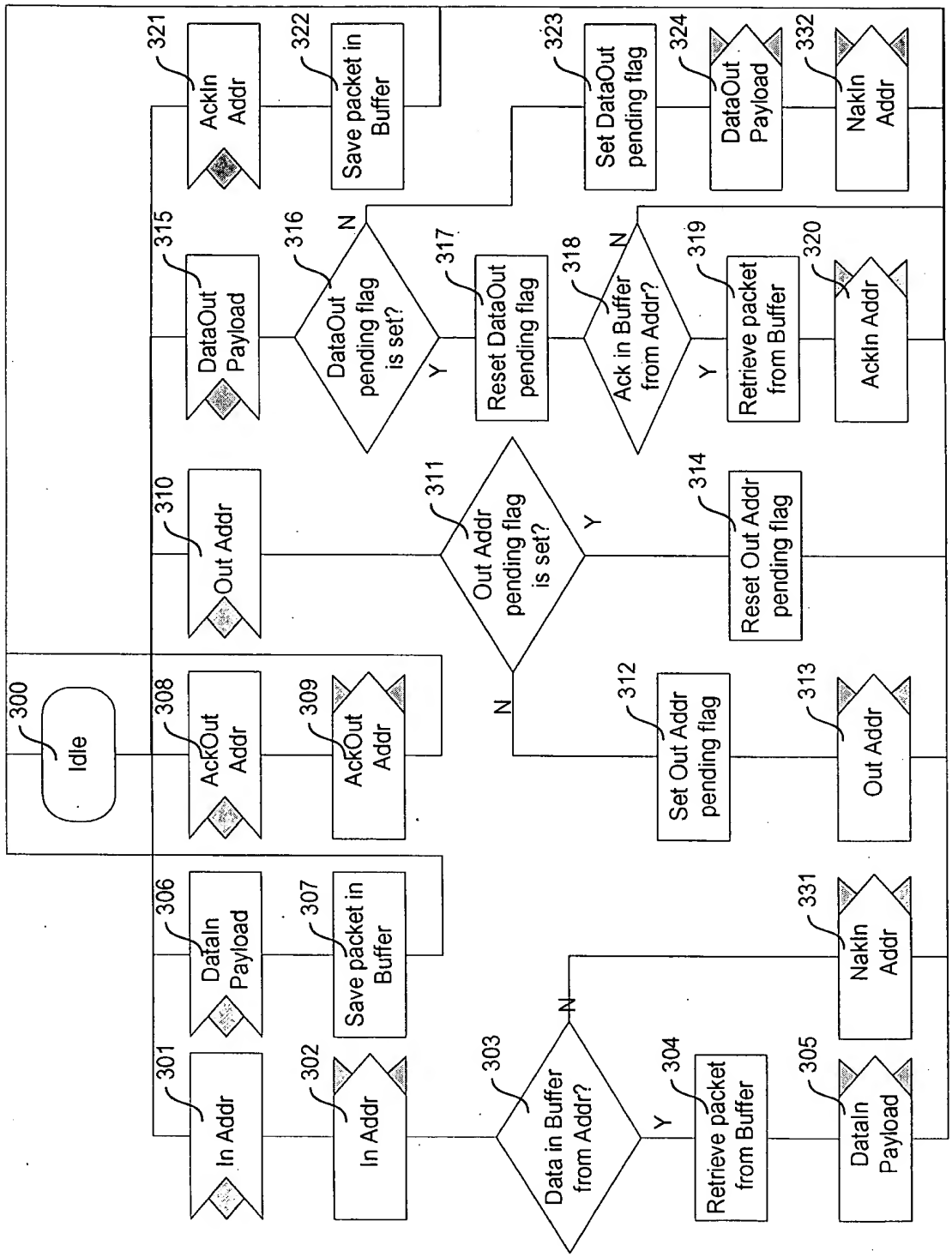
300
Idle
301
In Addr
302
In Addr
303
Data in Buffer from Addr?
304
Retrieve packet from Buffer
305
DataIn Payload
306
DataIn Payload
307
Save packet in Buffer
308
AckOut Addr
309
AckOut Addr
310
Out Addr
311
Out Addr pending flag is set?
312
Set Out Addr pending flag
313
Out Addr
314
Reset Out Addr pending flag
315
DataOut Payload
316
DataOut pending flag is set?
317
Reset DataOut pending flag
318
Ack in Buffer from Addr?
319
Retrieve packet from Buffer
320
AckIn Addr
321
AckIn Addr
322
Save packet in Buffer
323
Set DataOut pending flag
324
DataOut Payload
331
NakIn Addr
332
NakIn Addr
Y
N

Figure 23

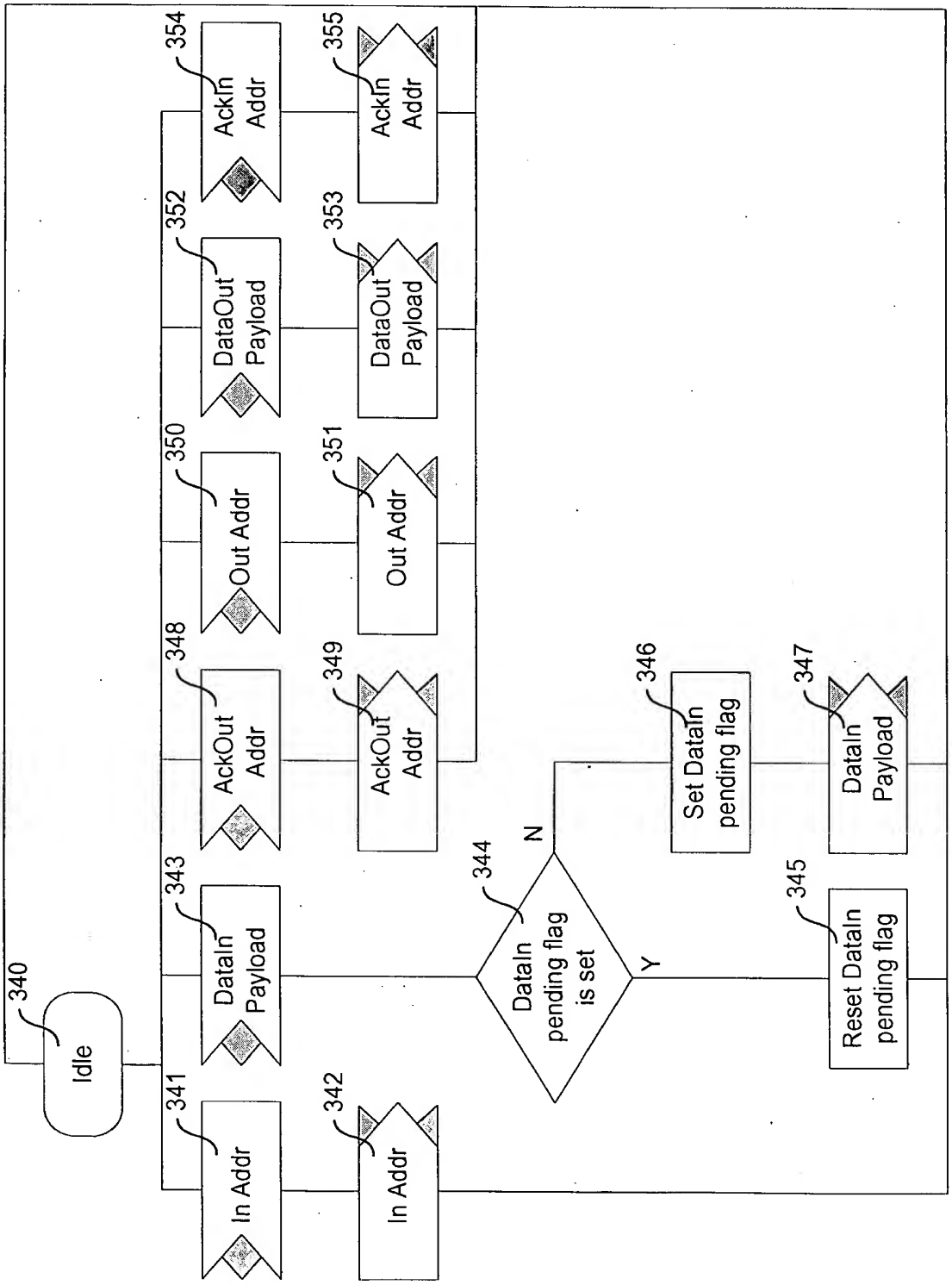
340
Idle
341
In Addr
342
In Addr
343
DataIn Payload
344
DataIn pending flag is set
N
Y
345
Reset DataIn pending flag
346
Set DataIn pending flag
347
DataIn Payload
348
AckOut Addr
349
AckOut Addr
350
Out Addr
351
Out Addr
352
DataOut Payload
353
DataOut Payload
354
AckIn Addr
355
AckIn Addr

Figure 24

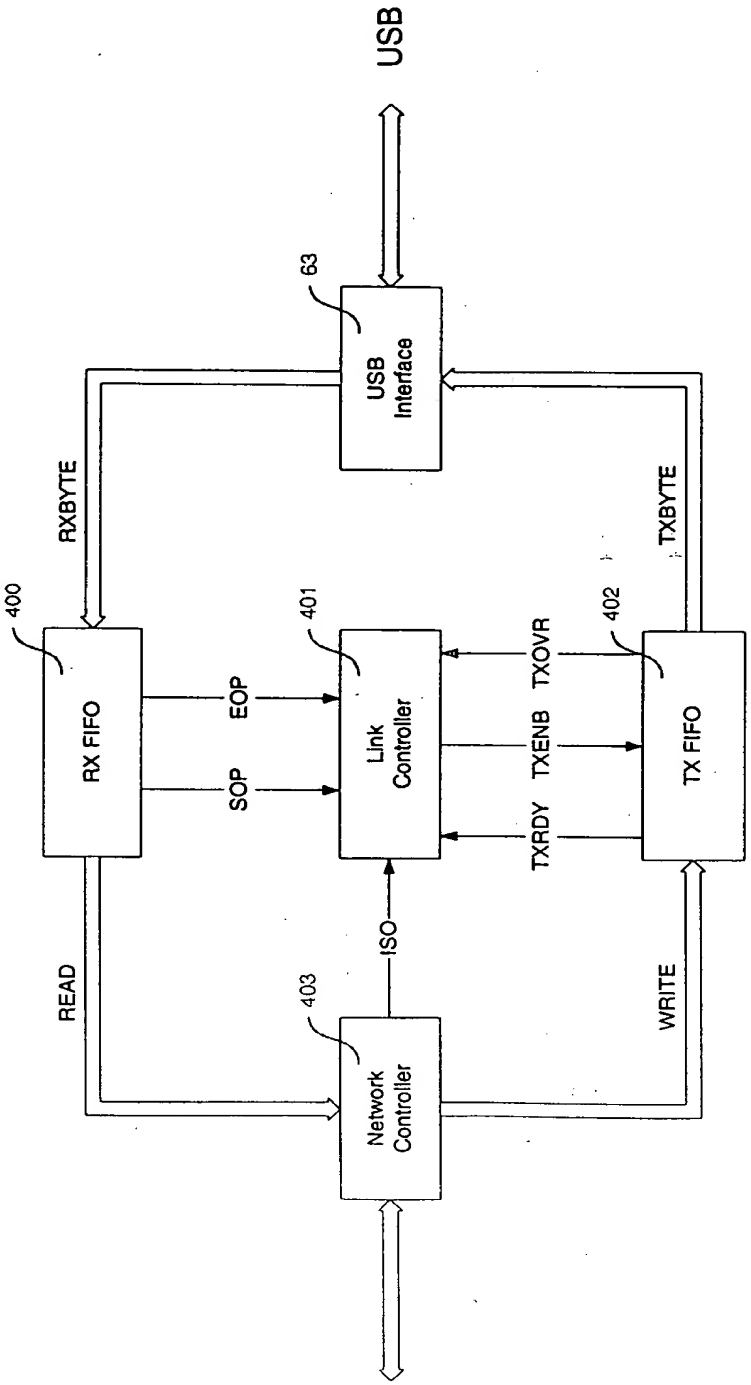
USB
63
USB Interface
RXBYTE
TXBYTE
400
RX FIFO
401
Link Controller
402
TX FIFO
EOP
SOP
TXOVR
TXENB
TXRDY
ISO
READ
WRITE
403
Network Controller

Figure 25

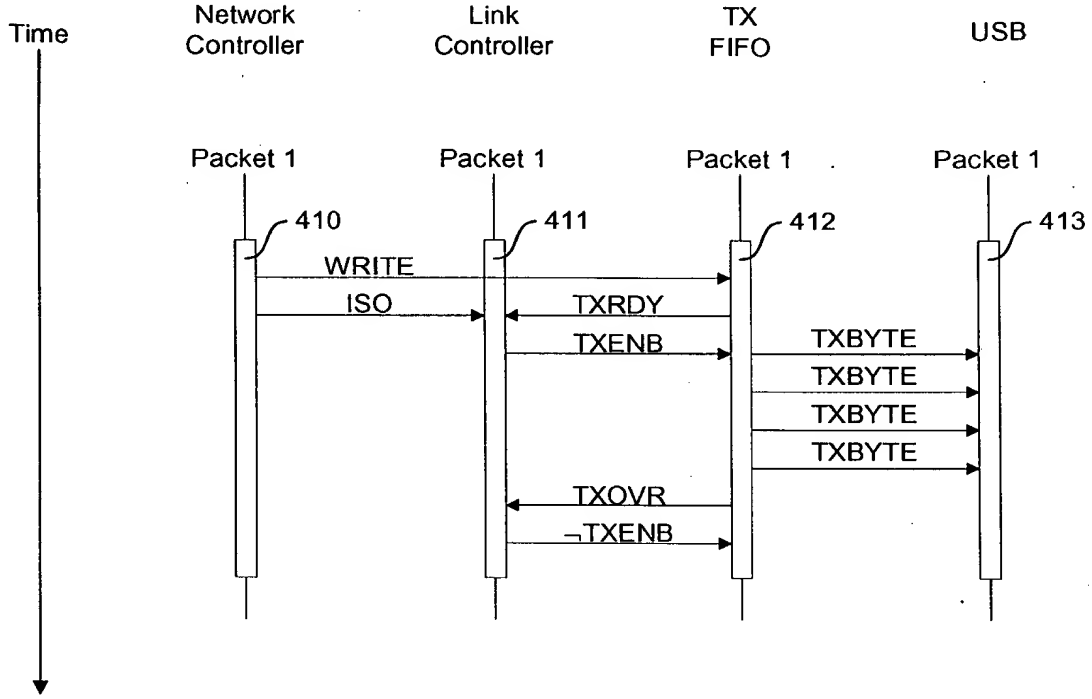
Time
Network Controller
Link Controller
TX FIFO
USB
Packet 1
Packet 1
Packet 1
Packet 1
410
411
412
413
WRITE
ISO
TXRDY
TXENB
TXBYTE
TXBYTE
TXBYTE
TXBYTE
TXOVR
¬TXENB

Figure 26

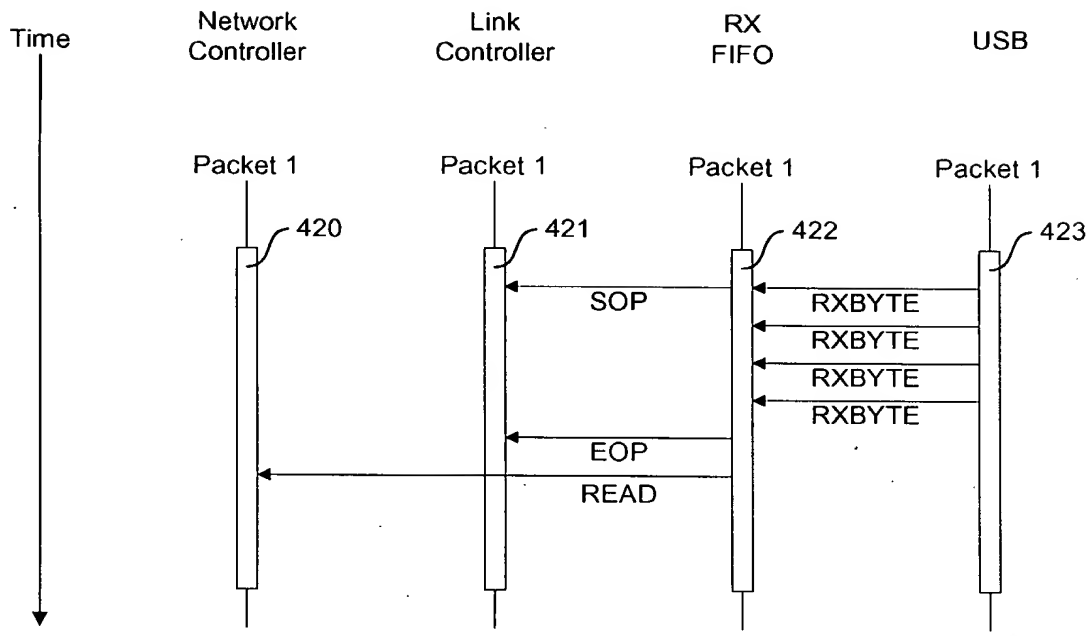
Time
Network Controller
Link Controller
RX FIFO
USB
Packet 1
Packet 1
Packet 1
Packet 1
420
421
422
423
SOP
RXBYTE
RXBYTE
RXBYTE
RXBYTE
EOP
READ

Figure 27

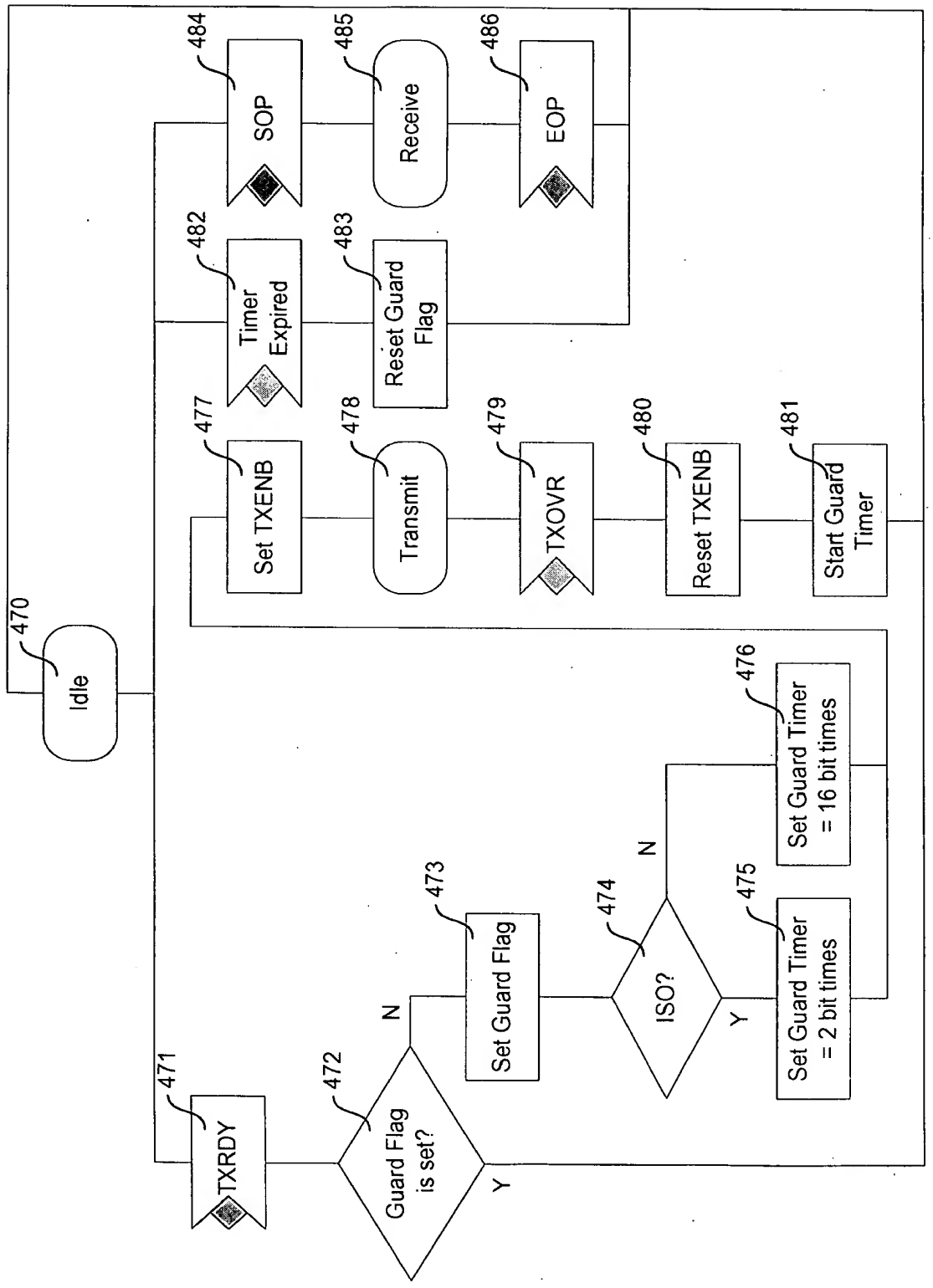
Idle
470
TXRDY
471
Guard Flag is set?
472
N
Y
Set Guard Flag
473
ISO?
474
N
Y
Set Guard Timer = 2 bit times
475
Set Guard Timer = 16 bit times
476
Set TXENB
477
Transmit
478
TXOVR
479
Reset TXENB
480
Start Guard Timer
481
Timer Expired
482
Reset Guard Flag
483
SOP
484
Receive
485
EOP
486

Figure 28

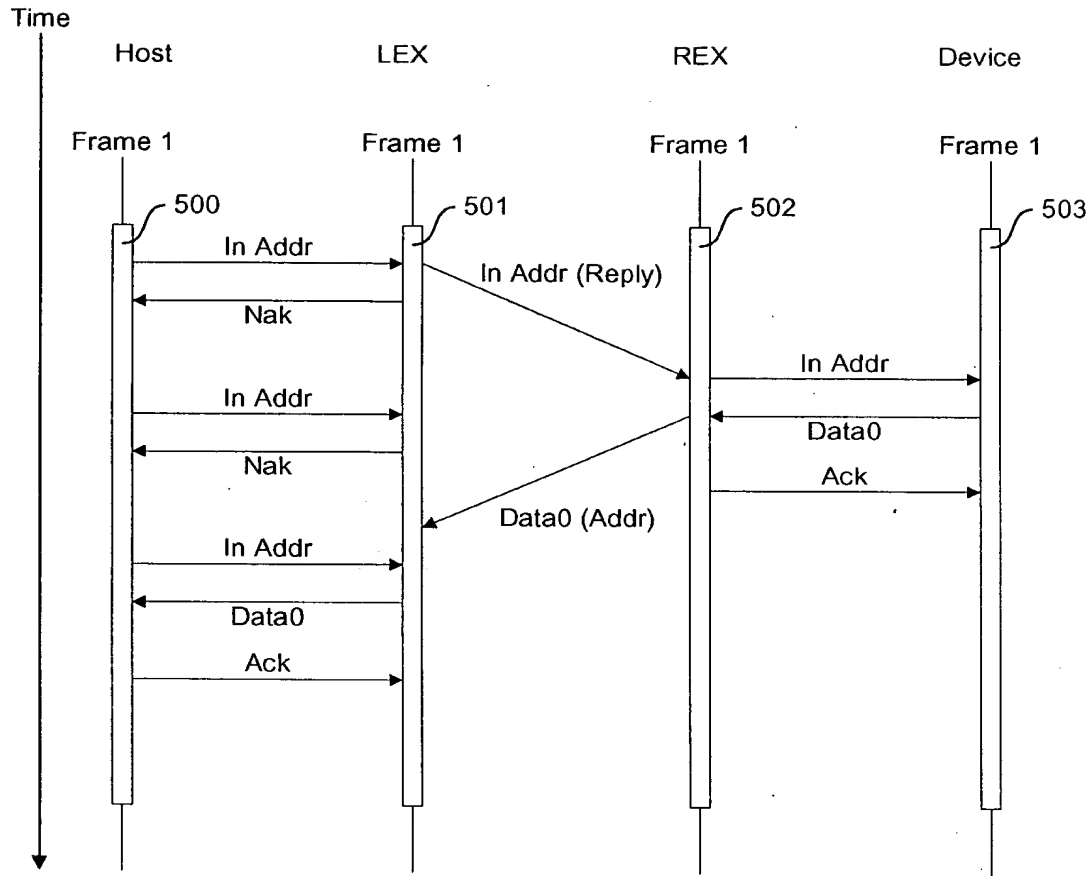
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
500
501
502
503
In Addr
In Addr (Reply)
Nak
In Addr
In Addr
Data0
Nak
Ack
Data0 (Addr)
In Addr
Data0
Ack

Figure 29

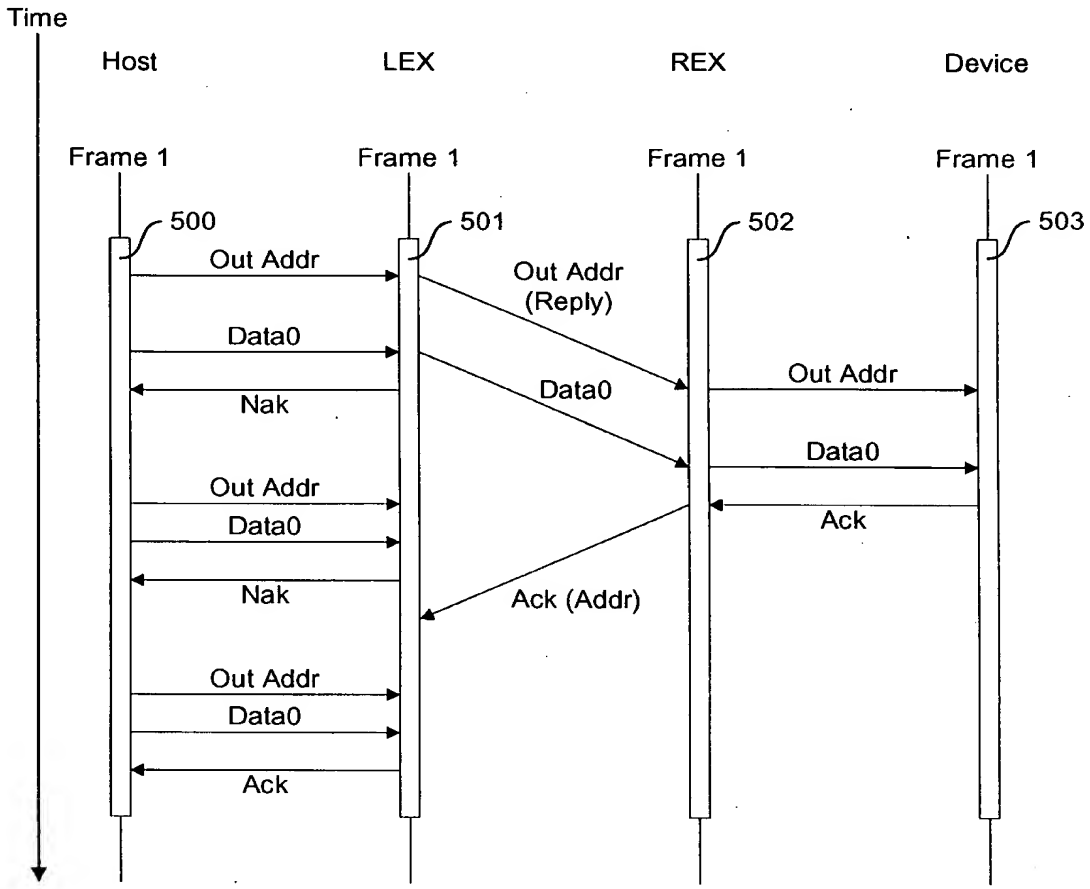
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
500
501
502
503
Out Addr
Out Addr
(Reply)
Data0
Data0
Out Addr
Nak
Data0
Out Addr
Data0
Ack
Nak
Ack (Addr)
Out Addr
Data0
Ack

Figure 30

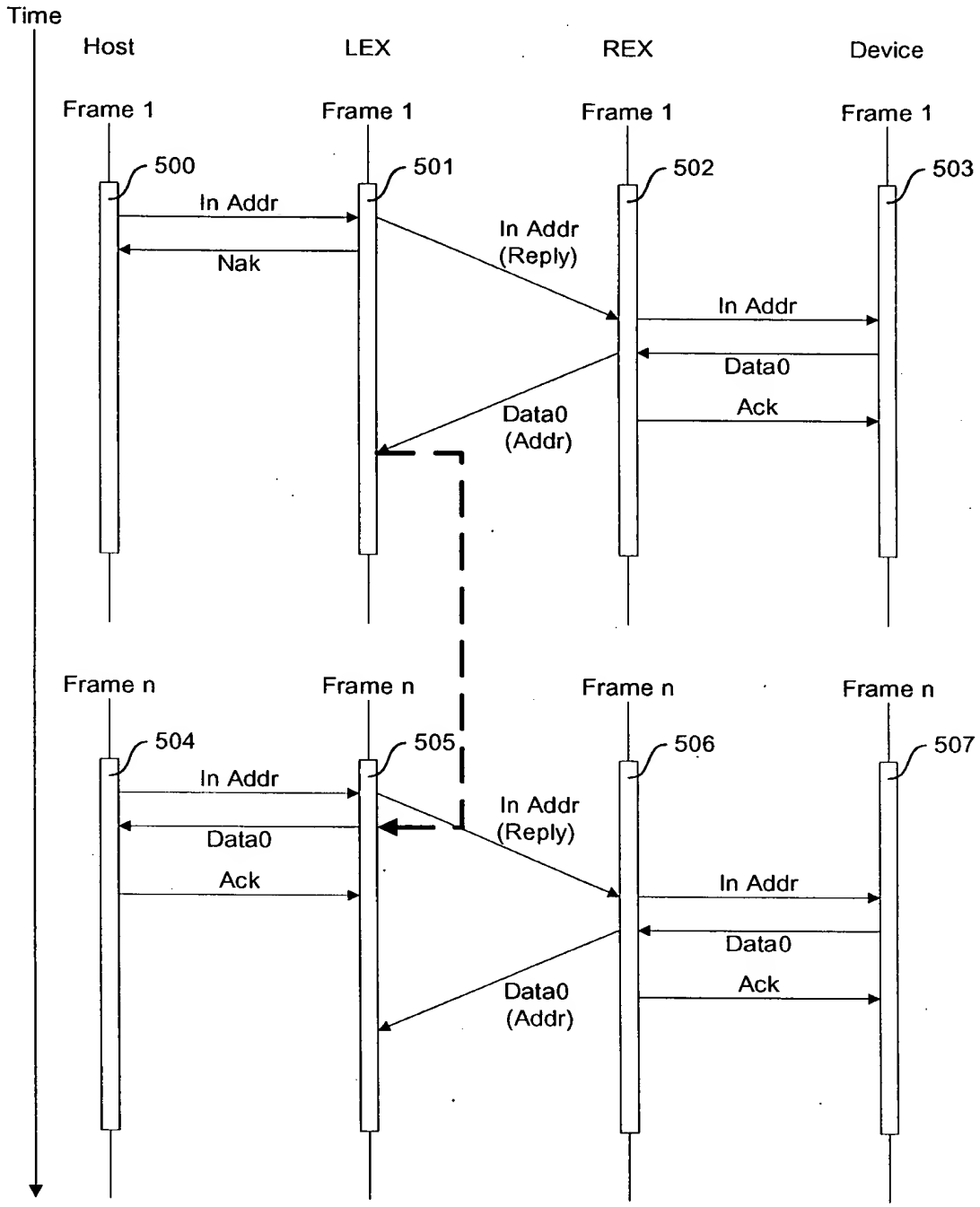
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
500
501
502
503
In Addr
Nak
In Addr
(Reply)
In Addr
Data0
Ack
Data0
(Addr)
Frame n
Frame n
Frame n
Frame n
504
505
506
507
In Addr
Data0
Ack
In Addr
(Reply)
In Addr
Data0
Ack
Data0
(Addr)

Figure 31

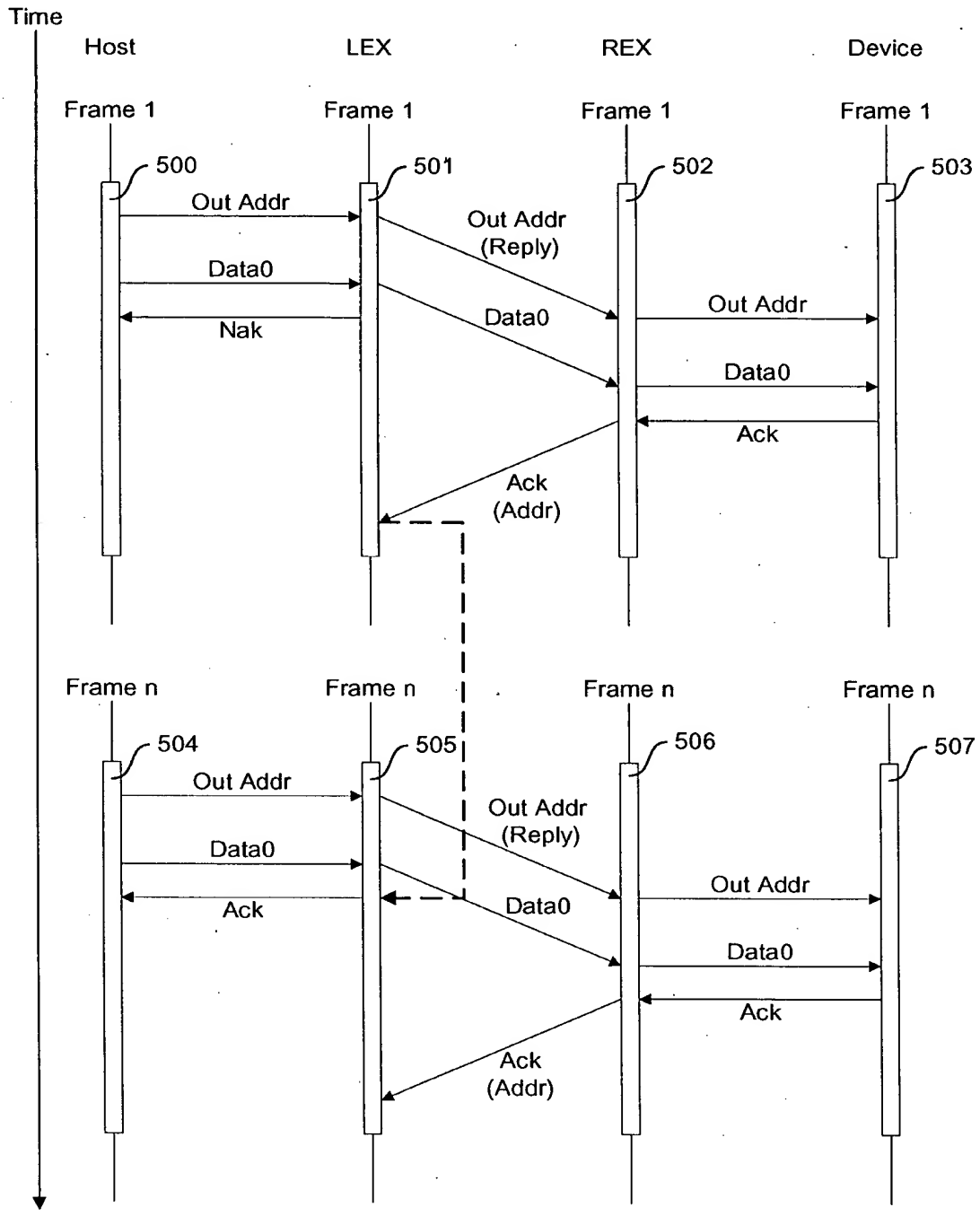
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
500
501
502
503
Out Addr
Out Addr
(Reply)
Data0
Data0
Out Addr
Nak
Data0
Ack
Ack
(Addr)
Frame n
Frame n
Frame n
Frame n
504
505
506
507
Out Addr
Out Addr
(Reply)
Data0
Out Addr
Ack
Data0
Data0
Ack
Ack
(Addr)

Figure 32

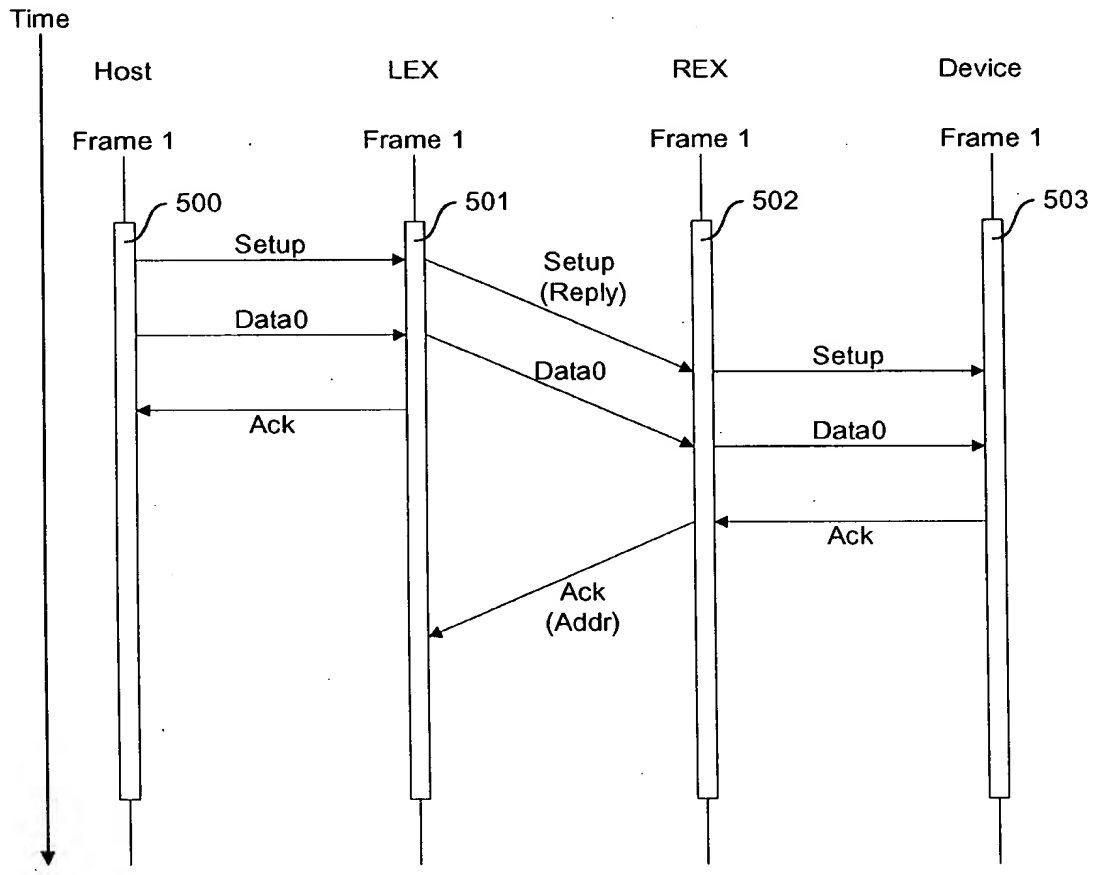
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
500
501
502
503
Setup
Setup
(Reply)
Data0
Data0
Setup
Ack
Data0
Ack
Ack
(Addr)

Figure 33

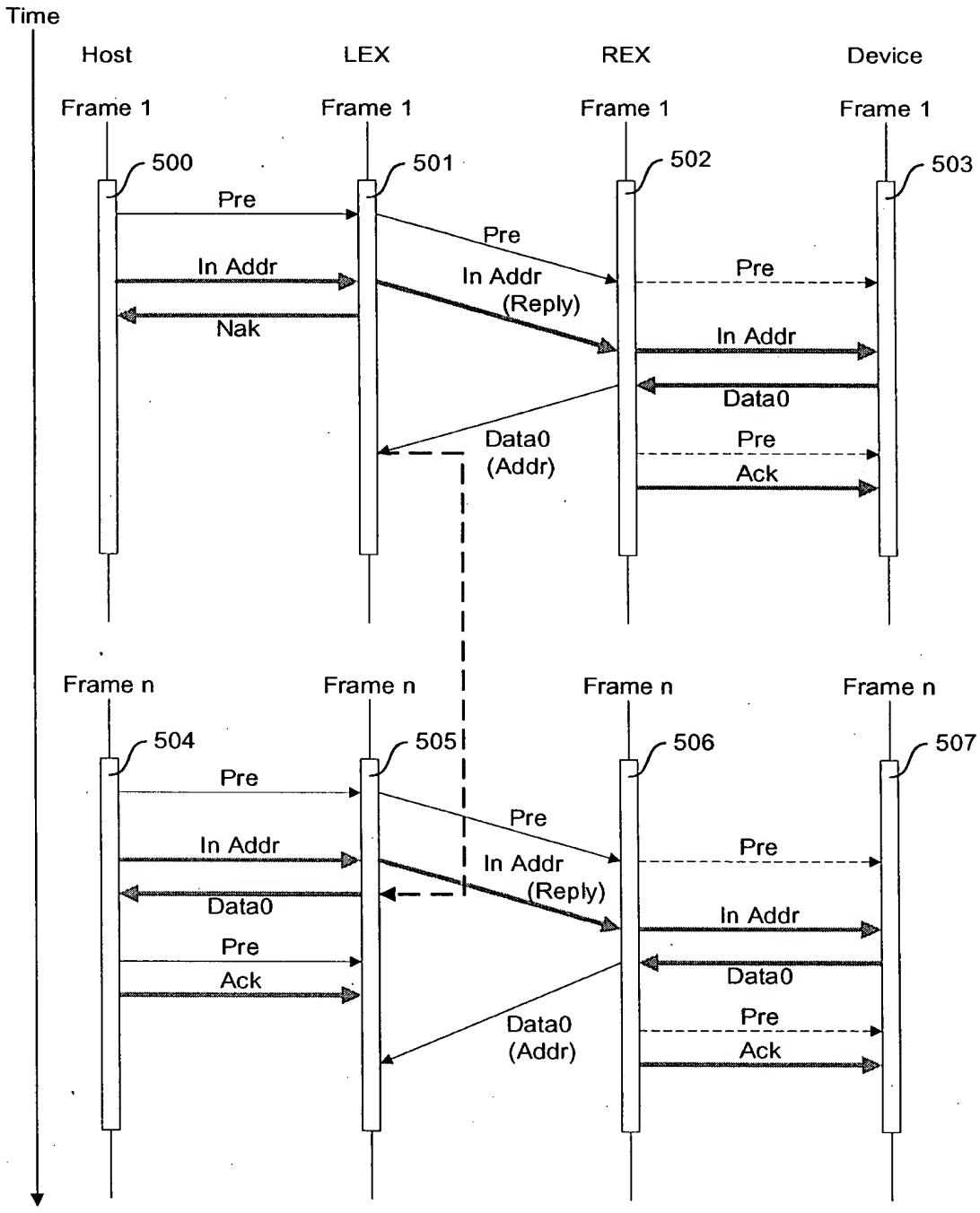
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
500
501
502
503
Pre
Pre
In Addr
In Addr
(Reply)
Pre
Nak
In Addr
Data0
Data0
(Addr)
Pre
Ack
Frame n
Frame n
Frame n
Frame n
504
505
506
507
Pre
Pre
In Addr
In Addr
(Reply)
Pre
Data0
In Addr
Pre
Data0
Ack
Data0
(Addr)
Pre
Ack

Figure 34

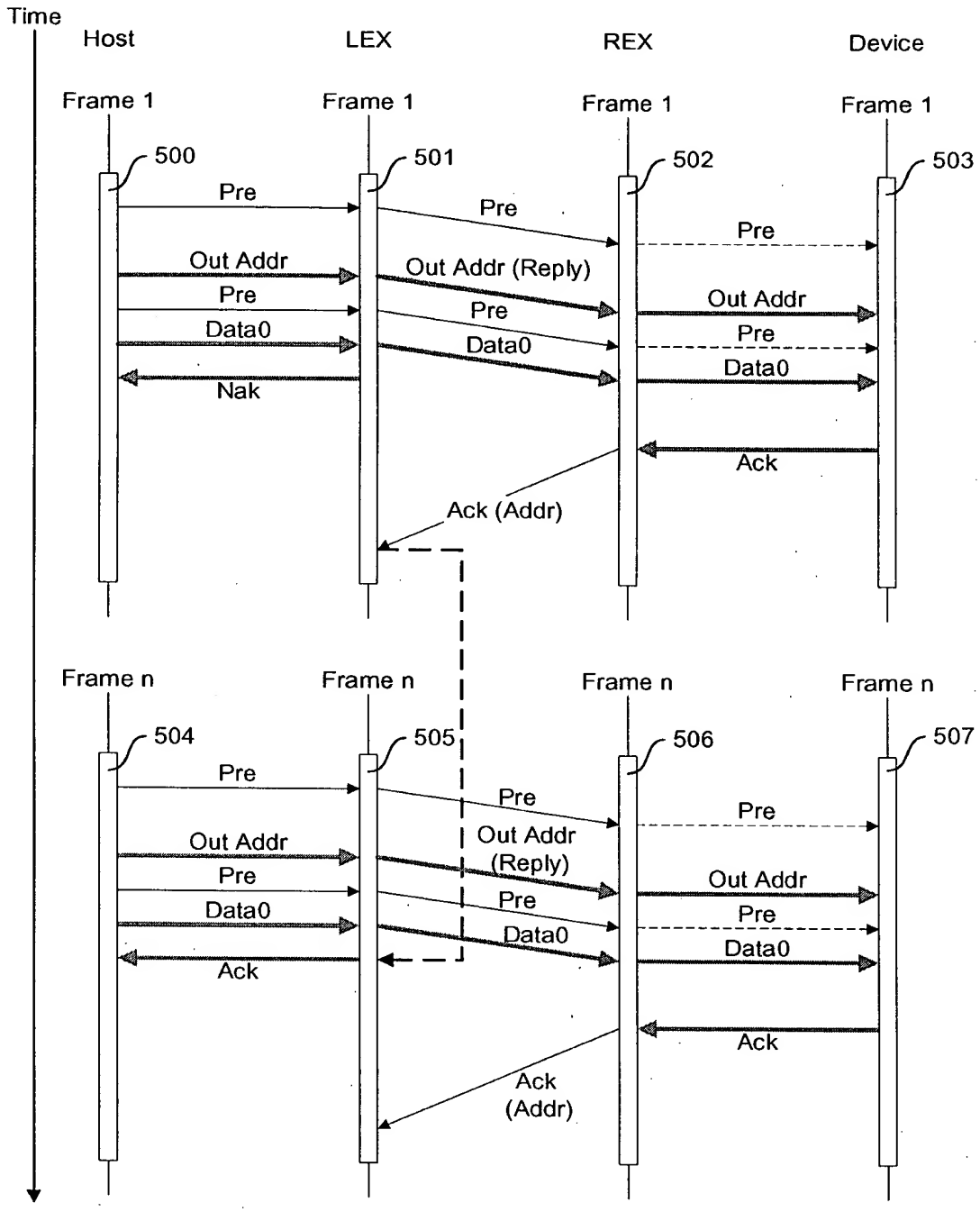
Time
Host
LEX
REX
Device
Frame 1
Frame 1
Frame 1
Frame 1
500
501
502
503
Pre
Pre
Pre
Out Addr
Out Addr (Reply)
Out Addr
Pre
Pre
Pre
Data0
Data0
Data0
Nak
Ack
Ack (Addr)
Frame n
Frame n
Frame n
Frame n
504
505
506
507
Pre
Pre
Pre
Out Addr
Out Addr (Reply)
Out Addr
Pre
Pre
Pre
Data0
Pre
Data0
Data0
Ack
Ack
Ack (Addr)

Figure 35